CLAIMS

1. Method for the reconstruction of holographic images, the holographic image being detected by an image detection device (9), the holographic image being transformed in a digitized hologram (10), the digitized hologram (10) being comprised of a number V_r of elementary pixels, the size of which being equal to the holographic image sampling intervals, and of the V_r values (51) respectively associated to the elementary pixels, the method comprising a first step (11,12) of processing the digitized hologram array, and a second step (13,15,16,17,18) of hologram reconstruction in the observation plane starting from the digitized hologram processed in the first step, **the method being characterised in that** the second step is carried out through discrete Fresnel Transform applied on an array of V_e values corresponding to pixels having size equal to that of said elementary pixels, wherein said array of V_e values (50, 51) includes said array of V_r values and an integer number $p = V_e - V_r > 0$ of constant values (50) equal to OS, said number V_e of values being inversely proportional to the desired pixel size to be obtained for the reconstructed image (14).

2. Method according to claim 1, characterised in that said p constant values (50) are null values ($OS = 0$).

3. Method according to claim 1 or 2, characterised in that said p values (50) are arranged externally to said array of V_r values (51).

4. Method according to claim 3, characterised in that said p values (50) are arranged in a symmetrical way.

5. Method according to claim 3, characterised in that said p values (50) are arranged in a non-symmetrical way.

6. Method according to any one of the preceding claims, characterised in that the digitized hologram is a rectangular array of $V_r = N_r \cdot M_r$ values (51), each value corresponding to a rectangular pixel of sizes Δx, Δy.

7. Method according to claim 6, characterised in that the hologram reconstructed in the second step is represented by a rectangular array of $V_e = N_e \cdot M_e$ values, each value corresponding to a rectangular pixel of sizes $\Delta\xi = (\lambda d / N_e \Delta x)$ and $\Delta\eta = (\lambda d / M_e \Delta y)$, λ being the wavelength of the wave beam striking the object of which the hologram is recorded, and d the distance between the detection device and the object of which the

hologram is detected, $\Delta\xi$ and $\Delta\eta$ being the reconstructed holographic image sampling intervals.

8. Method according to claim 7, characterised in that $N_e = (\lambda d/\Delta x^2)$, $M_e = (\lambda d/\Delta y^2)$, $\Delta\xi = \Delta x$, $\Delta\eta = \Delta y$.

9. Method according to any one of the preceding claims, characterised in that, after the second step, if each holographic image sampling interval is not equal or less than a certain threshold, the number of values p (50) added to the digitized hologram array is increased and the second step is carried out again.

10. Method according to claim 9, characterised in that said threshold is a function of the signal-to-noise ratio of the holographic image.

11. Method according to any one of the preceding claims, characterised in that the method is performed for more than one holographic images detected at the same time for different wavelength λ, said more than one images being subsequently superposed in order to obtain a multi-colour final holographic image (14).

12. Computer program characterised in that it comprises code means apt to execute, when running on a computer, the method according to any one of claims 1 to 11.

13. Memory medium, readable by a computer, storing a program, characterised in that the program is the computer program according to claim 12.

14. Apparatus for detection of holographic images, comprising a digitized hologram processing unit, characterised in that the processing unit processes the detected data by using the method according to any one of claims 1 to 11.